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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/506,492

09/03/2004

Toshihiko Ushiro

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02/01/2006

JUDGE PATENT FIRM
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EXAMINER

PEACE, RHONDA S

ART UNIT

PAPER NUMBER

2874

DATE MAILED: 02/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/506,492

Applicant(s)

USHIRO ET AL.

Examiner

Rhonda S. Peace

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 January 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 6-16 is/are allowed.
- 6) ☒ Claim(s) 1-5 and 10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 September 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamasaki et al (US 4693544) and in further view of Shiono et al (US 5138495).

With regard to claim 1, Yamasaki et al discloses an optical fibers **13B**, **13C**, **13D**, and **13E** having a diffractive films **17B**, **17C**, **17D**, and **17E** respectively, formed upon the end portion of the optical fibers (Figure 6, column 5 lines 50-68, column 6 lines 1-4). However, Yamasaki et al does not disclose the use of a DLC layer, nor a diffractive grating included in the DLC layer, within the diffractive film. Shiono et al discloses the use of a diffractive optical lens coated with a diamond layer **12** (Figure 13, column 9 lines 34-68). As diamond is a form of carbon, it may be considered a “diamond-like-carbon” or DLC layer. This diamond layer, after formation, *exhibits the structure* of a diffraction grating, as it contains areas of high refractive index and low refractive index (within the “peaks” and “valleys” of the surface of the diamond layer). It would have been obvious to one of ordinary skill in the art to combine the above teachings to produce an optical fiber with a diffraction film upon its end face, where the film consists of the DLC layer and corresponding diffractive grating as taught by Shiono et al, as the addition of this DLC layer imparts strength to the structure (Shiono et al: column 9 lines 46-50), as well as allowing the structure to be simplified (Yamasaki et al: column 1 lines 20-29).

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamasaki et al (US 4693544) and in further view of Shiono et al (US 5138495).

Yamasaki et al and Shiono et al disclose the device as previously described. In addition, Yamasaki et al shows in Figure 6 that the diffractive films **17B**, **17C**, **17D**, and **17E** are capable of splitting a beam, originating from optical fiber **13A** and having a plurality of wavelengths, into a plurality of beams containing a single wavelength

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(column 5 lines 50-68, column 6 lines 1-4). This device as shown in Figure 6 would also function to combine the beams having differing wavelengths into a single beam with a plurality of wavelengths if operation was reversed, as is known since Yamasaki et al refers to the device as a multiplexer/demultiplexer (column 4 lines 62-65).

Claim 3 is rejected under 35 U.S.C. 103 (a) as being unpatentable over Yamasaki et al (US 4693544) in view of Shiono et al (US 5138495), and in further view of Iizuka et al (US 6388811).

Applicable to claim 3, the optical diffractive film device, as produced by the combined teachings of Yamasaki et al and Shiono et al, is described above. However, Yamasaki et al and Shiono et al do not disclose the specific function of allowing a single wavelength beam to be split into a plurality of beams, as well as causing a plurality of single wavelength beams to be combined into a single beam. Iizuka et al discloses an optical diffractive grating, formed of local areas of high and low refractive index. The diffractive grating allows a single wavelength beam to be split into a plurality of beams, as well as causes a plurality of single wavelength beams to be combined into a single beam (column 2 lines 28-45). It would have been obvious to one of ordinary skill in the art to combine the teachings of Yamasaki et al, Shiono et al and Iizuka et al, as they illustrate the functions the optical film of Yamasaki et al and Shiono et al are capable of, as they themselves have a diffraction grating. In addition, the strength of the "DLC" layer of Shiono et al would impart additional strength to the diffraction grating of Iizuka et al (Shiono et al: column 9 lines 46-50).

Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamasaki et al (US 4693544) in view of Shiono et al (US 5138495), and in further view of Hida et al (US 2004/0247243).

Pertaining to claims 4 and 5, the optical diffractive film device, as produced by Yamasaki et al in view of Shiono et al, is described above. However, Yamasaki et al and Shiono et al (US 5138495) do not disclose the specific functions of acting as a polarization-division multiplexer/demultiplexer, and acting as a wave-plate with respect to TE and TM waves. Hida et al discloses a waveguide diffraction-type multiplexer/demultiplexer having polarization-division functionality (paragraph 0006-0008, Figure 1). The diffraction-type multiplexer/demultiplexer is capable of combining TE and TM waves and separating TE and TM waves (paragraph 0061, 0066, 0073, Figure 5). In addition, the diffraction-type multiplexer/demultiplexer has wave-plate functionality with respect to TE and TM waves (paragraphs 0066 and 0068, Figure 5). It would have been obvious to one of ordinary skill in the art to combine the teachings of Yamasaki et al, Shiono et al, and Hida et al, as the strength of the DLC layer(s) of Shiono et al would impart additional strength to the structure of Hida et al (Shiono et al: column 9 lines 46-50).

Claim 10 (as dependent upon claim 1, and further referred to as 10₁) is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamasaki et al (US 4693544) and in further view of Shiono et al (US 5138495).

Referring to claim 10₁, Yamasaki et al, in view of Shiono et al, disclose the device as previously outlined. Yamasaki et al, in view of Shiono et al do not disclose the

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specific functional limitations of the device being operation between wavelengths 0.8 microns and 2.0 microns. However, Yamasaki et al discloses the optical diffraction film for use in multiplexer/demultiplexer, optical switch or optical coupler, all that utilize a wide range of wavelengths, including between 0.8 microns and 2.0 microns. Therefore, it would have been obvious to one of ordinary skill in the art to fashion an optical diffraction film that may be utilized within this range, as it is a range utilized by optical system for which the device is designed.

Allowable Subject Matter

Claims 6-9, 10₆, 11₁, 11₆, 12, and 13₁, 13₆, 14₁, 14₆, 15, and 16 are allowed.

The following is an examiner's statement of reasons for allowance: The applicable prior art discussed within this Office Action does not disclose, nor does it reasonably suggest an optical fiber comprising numerous diffraction gratings formed upon the end face of the fiber, where the first diffraction grating containing DLC has polarization-division demultiplexing functionality for splitting TE and TM waves, and the second diffraction grating containing DLC has wave plate functionality with respect to either TE or TM waves. It is the examiner's opinion that these limitations of claim 6 constitute allowable subject matter, as do claims 7-9, 10₆, 11₆, 12, 13₆, 14₆, 15, and 16, as they are either directly or indirectly dependent upon allowable claim 6. In addition, the applicable prior art does not disclose, nor does it reasonably suggest, forming the regions of high refractive index within the diffraction grating using an energy beam to *irradiate* the DLC layer. It is the examiner's opinion that these limitations of claim 11₁

constitute allowable subject matter, as do claims 13₁ and 14₁ as they are either directly or indirectly dependent upon allowable claim 11₁.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

Applicant's arguments filed 1/17/2006 have been fully considered but they are not persuasive. Applicant have argued that the combination of references set forth above fails to teach the elements of claim 1 for several reasons: (1) The protective layer 12 disclosed by Shiono et al is "clearly not an optical element in the lens," and (2) Shiono et al does not disclose the protective layer 12 having a diffraction grating or "even local regions of relatively high refractive index and local regions of relatively low index" as recited in claim 1, and, (3) Shiono et al do not "even teach the protective layer 12 is transparent", as is recited by claim 1.

Pertaining to reason (1), the Examiner agrees with the Applicant that the protective layer 12 functions as a protective barrier for the reflecting film under it, protecting it from oxidation as well as physical scarring (Shiono, column 9 lines 46-54). However, the Examiner reminds the Applicant that it is not recited in claim 1 that the DLC layer (and therefore the corresponding protective layer 12 of Shiono et al) *perform* as an optical element, instead merely claiming the *structure* of such a device. Claim 1 requires that a DLC layer have a diffraction grating which contains areas of relatively

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high and relatively low refractive indices in a periodic fashion, which is met by Shiono et al, and will be discussed further. Even though protective layer 12 is deemed by the Applicant to be other than “an optical element,” this determination does not negate the applicable nature of the structure of Shiono et al, *as it is the structure of the diffraction grating, and not the reflecting or refracting abilities of the diffraction grating, which is claimed in claim 1.*

Pertaining to reason (2), while Shiono et al does not specifically disclose the diffraction grating nature of the protective film 12, it is inherently present, as the protective film 12 contains localized areas of high and low refractive index. As discussed before, the protective layer 12, after formation, *exhibits the structure* of a diffraction grating, as it contains areas of high refractive index and low refractive index (within the “peaks” and “valleys” of the surface of the diamond layer). Simply put, the “valleys” of the layer (i.e. where there exists an area of air, having an n-value of 1, between two “peaks” of film) have a lower index of refraction than the “peaks,” as the “peaks” consist of the film material, having an index of refraction greater than 1. Therefore, one may consider the structure of the protective layer to have the same structure as a diffraction grating.

Addressing reason (3), while the Applicant is correct that several materials suggested for the protective layer are opaque, such as metals, paints, and graphite, the Applicant has failed to realize that Shiono et al has also suggested materials such as silicon dioxide, silicon oxide, and magnesium fluoride, which are transparent. For this reason, the Examiner remains constant that Shiono et al has disclosed methods by

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which to make the protectively layer both transparent and opaque, and therefore it cannot be asserted by the Applicant that Shiono et al fails to disclose a "transparent layer."

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rhonda S. Peace whose telephone number is (571) 272-8580. The examiner can normally be reached on M-F (8-5).

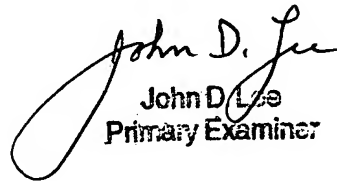
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272- 2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rhonda S. Peace
Examiner
Art Unit 2874



John D. Lee
Primary Examiner